



Competency 4.2 Radiation protection personnel shall demonstrate the ability to evaluate the adequacy of local compliance with the requirements of the following radiation protection orders and regulations.

- 10 CFR 835, *Occupational Radiation Protection*
- DOE N 5400.13, *Sealed Radioactive Source Accountability*
- DOE Order 5480.4, *Environmental Protection, Safety, and Health Protection Standards*
- DOE Order 5400.5, *Radiation Protection of the Public and Environment*
- DOE Order 5480.11, *Radiation Protection for Occupational Workers*
- DOE N 5480.10, *Radiological Control Manual* (DOE/EH-0256T)
- DOE Order 5530.3, *Radiological Assistance Program*
- DOE Order 5530.5, *Federal Radiological Monitoring and Assessment Center*

1. Supporting Knowledge and/or Skills

- a. Using the listed Orders, prepare an action plan that adequately outlines interviews and observations to be conducted, and details documents to review during an evaluation of contractor compliance with radiation protection requirements.
- b. Using an appropriate level of coverage, conduct an evaluation of contractor compliance with radiation protection requirements. During this evaluation, demonstrate the ability to properly conduct interviews, make observations, and document reviews.
- c. Given data from an evaluation, analyze the results of the evaluation to determine contractor compliance or noncompliance with the requirements.
- d. Given the results from an analysis of contractor compliance or noncompliance, document the results and communicate the results to contractor and department line management.



2. Summary

DOE Orders are in a state of transition. However, Order cancellation does not necessarily mean the order is no longer in effect. For example, DOE N 441.1, *Radiological Protection for DOE Activities*, which cancels four radiation protection related Orders, states:

"Cancellation of an Order does not, by itself, modify or otherwise affect any contractual obligation to comply with such an Order. Canceled Orders that are incorporated by reference in a contract shall remain in effect until the contract is modified to delete the reference to the requirements in the canceled Orders."

The following summary of DOE Orders will review, if necessary, the requirements for the new Order that now supersedes the competency Order.

10 CFR 835, <i>Occupational Radiation Protection</i>	
Purpose	Implements, within DOE, the Radiation Protection Guidance to Federal Agencies for Occupational Exposure and other radiation protection standards. The standards set forth in this rule help to ensure that DOE facilities are operated in a manner such that occupational radiation exposure to workers is maintained within acceptable limits and as low as reasonably achievable (ALARA).
Scope	DOE facilities
Requirements/ Key Words	<p><u>Subpart A, General Provisions</u>, establishes radiological protection standards, limits, and program requirements for protecting individuals from ionizing radiation resulting from DOE activities.</p> <p><u>Subpart B, Radiation Protection Programs (RPP)</u>, includes the plans, schedules, and measures to be taken by the M & O Contractor to comply with all requirements in Part 835. An RPP for each DOE site was due on Jan. 1, 1995, to DOE Headquarters.</p> <p><u>Subpart C, Standards for Internal and External Exposure</u>, addresses limits for:</p> <ul style="list-style-type: none">• General employees (occupationally exposed)• Minors (occupationally exposed)• General public <p>It also addresses:</p> <ul style="list-style-type: none">• Planned special exposures• Nonuniform exposure of the skin• Concentrations of radioactive material in the air <p><u>Subpart D, Reserved</u></p>

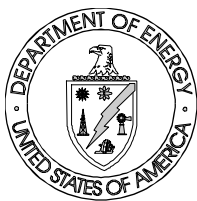


10 CFR 835, Occupational Radiation Protection (cont.)	
Requirements/ Key Words (cont.)	<p><u>Subpart E, Monitoring in the Workplace</u>, addresses:</p> <ul style="list-style-type: none"> • General requirements • Instrumentation • Individual monitoring - external • Individual monitoring - internal • Area monitoring • Radioactive contamination control and monitoring <p><u>Subpart F, Entry Control Programs</u>, addresses:</p> <ul style="list-style-type: none"> • Radiological Areas • High Radiation Areas • Very High Radiation Areas <p><u>Subpart G, Posting and Labeling</u>, addresses requirements for signs:</p> <ul style="list-style-type: none"> • DOE-approved signs • Yellow background • Black or magenta radiation symbols • Clear and conspicuous signs and specific posting requirements for: <ul style="list-style-type: none"> - Controlled Areas - Radiation Areas - High Radiation Areas - Very High Radiation Areas - Airborne Radioactive Areas - Contamination Areas - High Contamination Areas <p><u>Subpart H, Records</u>, addresses requirements for documenting compliance with Part 835, the RPP, and, in particular, those actions that demonstrate compliance with the ALARA provisions of the rule.</p> <p><u>Subpart I, Reports to Individuals</u>, requires, on an annual basis, each DOE facility or DOE contractor-operated facility to provide each individual monitored for occupational exposure a radiation dose report of his/her occupational exposure at the facility.</p> <p><u>Subpart J, Radiation Safety Training</u>, requires the training of general employees, radiological workers, and control technicians; verification by examination; intervals of training not to exceed two years; and a provision for acceptance of training from other facilities.</p> <p><u>Subpart K, Design and Control</u>, addresses added emphasis on facility and equipment design and administrative controls in order to maintain radiological exposures ALARA.</p>



Radiation Protection Competency 4.2

10 CFR 835, Occupational Radiation Protection (cont.)	
Requirements/ Key Words (cont.)	<p><u>Subpart L, Release of Materials and Equipment from Radiological Areas</u>, cannot be removed from controlled areas unless measurements are made to establish that removable contamination, and the combination does not exceed predetermined values.</p> <p><u>Subpart M, Reserved</u></p> <p><u>Subpart N, Accidents and Emergencies</u>, addresses:</p> <ul style="list-style-type: none"> • Employees who have exceeded dose limits • Emergency exposure guidelines • Nuclear accident dosimetry
DOE N 441.1, Radiological Protection for DOE Activities	
<p>NOTE: DOE N 441.1 supersedes DOE N 5400.13, <i>Sealed Radioactive Source Accountability</i>, and DOE Order 5480.11, <i>Radiation Protection for Occupational Workers</i> .</p> <p>Contractors shall be directed to continue to comply with the requirements of Orders canceled by this notice until their contracts are modified to delete the reference to the requirements of the canceled Orders.</p>	
Purpose	Establishes radiological protection program requirements that, combined with 10 CFR 835 and its associated implementation guidance, form the basis for a comprehensive program for protection of individuals from the hazards of ionizing radiation in controlled areas. These requirements shall remain in effect pending completion of the Department's rulemaking efforts to codify these or equivalent requirements.
Scope	This Notice applies to all defense nuclear facilities classified as hazard categories 1,2, or 3 that are subject to the requirements of 10 CFR 835, and to contractors that operate defense nuclear facilities.
Requirements/ Key Words	<p><u>Administrative Control Levels</u></p> <p>A system of administrative control levels (ACLs) shall be implemented to control radiological worker doses at levels below the occupational exposure limits provided in 10 CFR 835.202.</p> <ol style="list-style-type: none"> 1. A DOE ACL of 2 rem (0.02 Sv) total effective dose equivalent (TEDE) per year shall be implemented. No individual shall be permitted to receive an occupational exposure during planned activities that would result in exceeding the DOE ACL without the specific written authorization of the cognizant secretarial officer or designee. 2. A cumulative total effective dose equivalent (CTEDE) ACL of 1 rem (0.01 Sv) TEDE per year of age shall be implemented. When a radiological worker's CTEDE exceeds 1 rem TEDE per year of age, special ACLs shall be established during ensuing years as necessary to cause that individual's CTEDE to approach and, if possible, fall below 1 rem per year of age. 3. A facility-specific ACL shall be approved each year by facility management to maintain radiological worker doses below the DOE ACL. Written authorization by facility management shall be required prior to allowing any radiological worker's dose resulting from planned activities to exceed the facility-specific ACL.



Radiation Protection Competency 4.2

DOE N 441.1, <i>Radiological Protection for DOE Activities</i> (cont.)	
Requirements/ Key Words (cont.)	<p><u>Work Authorizations</u></p> <p>Authorizations to work in radiological areas shall be in accordance with the Radiological Protection Program required by 10 CFR 835.101. This program, in part, shall describe a radiological work authorization program as specified in 835.501 that appropriately utilizes available work documents and procedures. The level of detail included in these documents shall be commensurate with the nature and magnitude of the hazard and complexity of the required controls.</p> <p><u>Radiation Safety Training</u></p> <ol style="list-style-type: none"> 1. Radiation safety training for general employees, radiological workers, and radiological control technicians shall utilize those portions of the standardized core training materials published by DOE that are relevant to facility hazards and operations, augmented as necessary by site-specific materials. Documentation of satisfactory completion of the entire DOE standardized core course(s) shall be accepted by all DOE activities. 2. Training requirements commensurate with the hazard within a posted area shall be completed by an individual prior to permitting unescorted access to that area. <p><u>Posting</u></p> <p>Any accessible area in which radioactive material is used, handled, or stored shall be posted with the words "Caution, Radioactive Material." The posting shall meet the requirements of 10 CFR 835.601. The following areas are exempt from this posting requirement:</p> <ol style="list-style-type: none"> 1. Areas containing 10 or fewer sealed radioactive sources with activities below the accountability criteria established in Attachment 1, Values for Exemption of Sealed Radioactive Sources from Inventory and Source Integrity Tests. 2. Areas containing only materials that are properly packaged and labeled for transport in conformance with Department of Transportation regulations or corresponding DOE directives, and that are expected to enter into transportation in the immediate future (i.e., the current shift). 3. Areas under continuous observation and control of an individual knowledgeable of and empowered to implement required access control measures. 4. Areas posted as radiological areas in accordance with 10 CFR 835.603. 5. Other areas posted with radiological warning signs meeting the criteria established in 10 CFR 835.601. 6. Areas containing radioactive materials in quantities below the site- or facility-specified posting threshold. This threshold shall be established at a level below that which is likely to cause any individual to receive a TEDE in excess of 0.1 rem in a year.



Radiation Protection Competency 4.2

DOE N 441.1, <i>Radiological Protection for DOE Activities</i> (cont.)	
Requirements/ Key Words (cont.)	<p><u>Control of Sealed Radioactive Sources</u></p> <ol style="list-style-type: none"> 1. Administrative procedures shall be developed and maintained to control sealed radioactive sources having values equal to or exceeding those in Attachment 1, Values for Exemption of Sealed Radioactive Sources from Inventory and Source Integrity Tests. 2. Accountable sealed radioactive sources, or their storage containers or devices, shall be labeled with the standard radiation warning trefoil and the words, "Caution, Radioactive Material." 3. An individual shall be designated to maintain control of assigned accountable sealed radioactive sources. Prior to being designated, the individual selected shall be trained as a radiological worker in accordance with 10 CFR 835.902 and instructed on site-specific source control procedures. 4. Each accountable sealed radioactive source shall be inventoried at intervals not to exceed six months. A two-month grace period may be used to accommodate scheduling needs. This inventory shall establish: <ul style="list-style-type: none"> • The physical location of each accountable sealed radioactive source. • The adequacy of associated postings and labels. • The adequacy of storage locations, containers, and devices. 5. Each accountable sealed radioactive source having an activity exceeding 0.005 μCi shall be subject to a source integrity test upon receipt, when damage is suspected, and at intervals not to exceed six months. A six-week grace period may be used to accommodate scheduling needs. Source integrity tests shall be capable of detecting radioactive material leakage equal to or exceeding 0.005 μCi. 6. Notwithstanding the requirements of paragraph 6.e.(5), an accountable sealed radioactive source is not subject to a periodic source integrity test if that source has been documented to have been removed from service. Such sources shall be stored in a controlled location, subject to periodic inventory as required by paragraph 6.e.(4) of this section, and subject to a source integrity test prior to being returned to service. 7. Notwithstanding the requirements of paragraph 6.e.(4) and 6.e.(5), an accountable sealed radioactive source is not subject to periodic inventory and source integrity tests if that source is located in an area that is inaccessible to individuals due to operational or environmental constraints. 8. An accountable sealed radioactive source found to be leaking radioactive material at a level exceeding 0.005 μCi shall be controlled in a manner that prevents the escape of radioactive material to the workplace.



Radiation Protection Competency 4.2

DOE N 441.1, Radiological Protection for DOE Activities (cont.)	
Requirements/ Key Words (cont.)	<p><u>Exposure of Minors</u> The exposure of minors during direct onsite access to a DOE site or facility shall be controlled such that the dose to the extremities, lens of the eye, and other organs and tissues does not exceed 10% of the corresponding occupational exposure limits established in 10 CFR 835.202. Appropriate monitoring of external and internal dose shall be performed to demonstrate compliance with these limits.</p> <p><u>DOE Laboratory Accreditation Program (DOELAP)</u> DOELAP shall be maintained consistent with the applicable DOE standards, and dosimetry programs shall be accredited at periodic intervals consistent with the standards. Additional guidance for the various program elements are contained in the DOELAP Technical Standard.</p>
DOE Order 5480.4, Environmental Protection, Safety and Health Protection Standards	
Purpose	Specifies and provides requirements for the mandatory ES&H standards applicable to DOE and DOE contractor operations; provides a listing of reference ES&H standards; and identifies the sources of the mandatory and reference ES&H standards.
Scope	DOE and DOE contractors
Requirements/ Key Words	<p>Provides a listing of reference ES&H standards.</p> <p>Identifies the sources of the mandatory and reference standards.</p>
DOE Order 5400.5, Radiation Protection of the Public and the Environment	
Purpose	Protects the public and the environment against undue risk of radiation due to operations of DOE and DOE contractor facilities.
Scope	DOE and DOE contractor facilities
Requirements/ Key Words	<p><u>Chapter I, General Summary</u> DOE is primarily adopting the ICRP 26/30 system of dose calculation, limitation, etc. The DOE primary standard is 100 mrem EDE in a year above background to members of the public from all pathways and sources. (This is reduced from the previous primary standard of 500 mrem in a year, since it is already largely being achieved and it follows the ICRP recommendation).</p> <p><u>Chapter II, Requirements for Radiation Protection of the Public and the Environment</u> The primary limit of 100 mrem EDE in a year is described in detail. The limit includes all pathways and sources and internal and external exposure. It does not include doses received from occupational exposures, naturally occurring background radiation, medical radiation, consumer products, or fallout. If justified, the public dose limit can be temporarily increased to 500 mrem through a request to EH-1.</p> <p><u>Chapter III, Derived Concentration Guides (DCGs) for Air and Water</u> DCGs are concentrations of a radionuclide in air or water that, under conditions of continuous exposure for one year by one exposure mode (e.g., ingestion of water), would result in an effective dose equivalent of 100 mrem. These are not limits, but tools to be used in meeting the basic requirements.</p>



Radiation Protection Competency 4.2

DOE Order 5400.5, <i>Radiation Protection of the Public and the Environment</i> (cont.)	
Requirements/ Key Words (cont.)	<p><u>Chapter IV, Residual Radioactive Material</u> Residual Radioactive Material:</p> <ul style="list-style-type: none"> Originally issued as guidance for Formerly Utilized Sites Remedial Action Program (FUSRAP) and Surplus Facilities Management Program (SFMP) Chapter IV of DOE Order 5400.5 now applies DOE-wide. Basic dose limit is 100 mrem above background effective dose equivalent in a year due to residual radioactive material. It is expected that the potential doses associated with actual or likely use of the released property will be a few mrem or less. This limit applies to all sources and pathways (excluding background and medical). The limits for radon and radon progeny are addressed separately. Guidelines for residual radioactive material in soil shall be derived by environmental pathway analysis except for thorium (Th) and radium (Ra). The RESRAD computer program is recommended, but alternate procedures are acceptable.
DOE/EH-0256T (Revision 1), <i>Radiological Control Manual</i>	
Purpose	<p>NOTE: The DOE <i>Radiological Control Manual</i> was initially issued as a requirements document for all DOE facilities to follow with respect to radiation protection. It is now considered a guidance document and is in the process of being revised.</p> <p>Establish and maintain a system of regulatory policy and guidance reflective of national and international radiation protection standards and recommendations.</p> <p>Ensure that personnel responsible for performing radiological work activities are appropriately trained.</p> <p>Ensure the technical competence of personnel responsible for implementing and overseeing the Radiological Controls Program.</p> <p>Establish and maintain, from the lowest to the highest levels, line management involvement and accountability for departmental radiological performance.</p> <p>Ensure that radiological measurements, analyses, worker monitoring results, and estimates of public exposures are accurate and appropriately made.</p> <p>Conduct radiological operations in a manner that controls the spread of radioactive materials, reduces exposure to the workforce and the general public, and utilizes a process that seeks exposure levels as low as reasonably achievable.</p> <p>Incorporate dose reduction, contamination reduction, and waste minimization features into the design of new facilities and significant modifications to existing facilities in the earliest planning stages.</p> <p>Conduct oversight to ensure that departmental requirements are being complied with and appropriate radiological work practices are being implemented.</p>



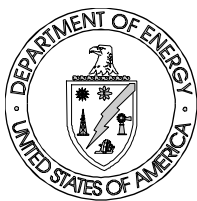
Radiation Protection Competency 4.2

DOE/EH-0256T (Revision 1), Radiological Control Manual (cont.)	
Scope	All Departmental elements
Requirements/ Key Words	<p>Chapter 1 Excellence in Radiological Control</p> <p>Chapter 2 Radiological Standards</p> <p>Chapter 3 Conduct of Radiological Work</p> <p>Chapter 4 Radioactive Materials</p> <p>Chapter 5 Radiological Health Support Operations</p> <p>Chapter 6 Training and Qualification</p> <p>Chapter 7 Records</p>
DOE Order 5530.3, Radiological Assistance Program	
Purpose	Establishes DOE policy, procedures, authorities, and responsibilities for its Radiological Assistance Program.
Scope	All Departmental elements and covered contractors.
Requirements/ Key Words	<p>DOE will provide advice and radiological assistance, as appropriate, upon request from other Federal agencies; state, local, and tribal agencies; private organizations; or private persons.</p> <p><u>Radiological Assistance Planning and Readiness</u></p> <ul style="list-style-type: none"> • Each Regional Coordinating Office shall prepare response plans and procedures. Plans shall include information on staff and equipment that may be available for a response and the actions the office will take to ensure the readiness of personnel and equipment. • Each Regional Coordinating Office's plan will concentrate on the response to small incidents and the initial response to major emergencies. • Each Regional Coordinating Office will predesignate one or more radiological assistance teams, composed of DOE and DOE contractor personnel with appropriate administrative capabilities, technical capabilities, and experience. The following considerations apply to members of radiological assistance teams: <ul style="list-style-type: none"> - Each team will be headed by a qualified DOE employee. - DOE and DOE contractor personnel are subject to the same rules and regulations as in their normal activities and are protected by the same insurance, compensation, liability, and tenure benefits in the event of personal property loss, injury, negligence, or error during the response to a request for radiological assistance. - Designated Radiological Assistance Program team members, through the security pass and identification process, shall be issued an official DOE radiological assistance identification card. - The Regional Coordinating Offices shall ensure that the designated members of radiological assistance teams can be notified and deployed when needed.



Radiation Protection Competency 4.2

DOE Order 5530.3, Radiological Assistance Program (cont.)	
Requirements/ Key Words (cont.)	<p><u>Reporting Requirements</u></p> <ul style="list-style-type: none"> Each Regional Coordinating Office shall keep a record of each request for assistance. Reports for incidents that were handled by telephone or by referral to another agency may consist of telephone logs showing the contacts, action, and disposition of the requests. The Regional Coordinating Offices shall prepare a separate report, with appropriate supporting documentation for each response that involves dispatching an assistance team. A summary of Radiological Assistance Program (RAP) activities for the past fiscal year shall be included in the field element's five-year Readiness Assurance Plan. This summary will contain brief descriptions of any significant responses, along with the following information: <ul style="list-style-type: none"> Number of radiological assistance calls received. Responses requiring a team response. Responses requiring a one-person response. Responses referred to other agencies. Responses at the request of other DOE field elements. Responses involving actual radioactive material. Occurrences that relate directly to internal RAP operations.
DOE Order 5530.5, Federal Radiological Monitoring and Assessment Center	
Purpose	Establishes DOE policy, procedures, authorities, and requirements for the establishment of a Federal Radiological Monitoring and Assessment Center (FRMAC), as set forth in the Federal Radiological Emergency Response Plan (FRERP) (50 FR 46542).
Scope	All Departmental elements and contractors
Requirements/ Key Words	<p><u>Concept of Operations</u></p> <ul style="list-style-type: none"> FRMAC will coordinate and provide Federal assistance in response to major radiological incidents. A FRMAC will be established when a major radiological emergency has been declared. DOE will establish and manage a FRMAC. Initial requests for assistance to a radiological incident from outside the DOE complex could be directed to any of the Department's sites, or directly to the Headquarters (HQ) Emergency Operations Center (EOC). For an incident occurring at a DOE facility, the department will be the Lead Federal Agency (LFA) and appoint the Lead Federal Agency Official (LFAO). In a major emergency, with DOE HQ approval (DP-20), Nevada shall establish a FRMAC to be used as a coordination center and base of operation for the offsite Federal radiological monitoring and assessment efforts, as well as a location for integrating these efforts with those of the state, local, and tribal authorities.



Radiation Protection Competency 4.2

DOE Order 5530.5, <i>Federal Radiological Monitoring and Assessment Center</i> (cont.)	
Requirements/ Key Words (cont.)	<p>During the establishment and operation of a FRMAC, DOE will provide advice and radiological assistance upon request from other Federal agencies; state, local, and tribal agencies; private organizations; or private persons in accordance with the FRERP.</p> <ul style="list-style-type: none"> Request for radiological support, which may entail the establishment of a FRMAC, including deployment of DOE emergency response assets, will be directed through the HQ EOC. Public information involving DOE assistance and FRMAC operations will be conducted in accordance with DOE 5500.4, FRERP, existing interagency agreements, and in coordination with state, local, and tribal officials. In accordance with DOE 5635.4 and DOE 5650.2B, DOE response teams shall protect classified information from unauthorized disclosure and take any necessary steps to secure classified materials until the authorized personnel arrive to take custody of the material. <p><u>FRMAC Operations</u></p> <ul style="list-style-type: none"> FRMAC shall assure the technical integrity of the environmental data and maintain an accountable database of all offsite environmental data; provide exposure rate, isotope concentrations, and projected dose contours for the affected areas; and any other assessments requested by the states, tribes, or the LFA. DOE staffing for FRMAC shall include trained and qualified personnel from appropriate Departmental HQ and field elements, with primary DOE support coming from the personnel and equipment that make up its emergency response assets/capabilities. <p><u>Reporting Requirements</u></p> <ul style="list-style-type: none"> Initial notification of any request for deployment of DOE assets in support of a FRMAC shall be immediately reported through the Department's EOC to DP-20. The FRMAC reporting requirements set forth in this Order are above and beyond requirements of DOE 5000.3A, <i>Occurrence Reporting and Processing of Operations Information</i>, that relate to occurrences at DOE facilities and the reporting requirements.

Assessments of facilities are done for many reasons--to determine regulatory compliance, to formally document the radiological control program strengths and weaknesses, to investigate a specific incident, and to document conditions that need a follow-up assessment. Deficiencies in a radiological control program may point to the need for an assessment. Some indications that an assessment is needed are:

- Exceeding administrative dose control levels or regulatory limits
- Loss of control of radioactive material
- Unmonitored/excessive release of radioactive material in the environment
- Excessive numbers of skin-contamination incidents
- Uptakes of radioactive material by employees
- Excessive numbers of radiological incidents
- Inadequate training
- Ineffective work control



- Incomplete or inaccurate radiological surveys
- Incomplete or inaccurate records

In addition to the aforementioned reasons, 10 CFR 835.102 states, "internal audits of all functional elements of the radiation protection program shall be conducted no less frequently than every three years and shall include program content and implementation."

In preparing for the assessment, one should "do his/her homework" by:

1. Reviewing operating history. The following documents can be extremely useful in preparing for the assessment:
 - Occurrence reports
 - Radiological deficiency reports
 - Violations/citations
 - Facility design changes
2. Examining previous assessment reports. Documents that could be helpful are:
 - DOE Tiger Team findings
 - Self-assessments
 - Corporate quality assurance reports
 - External audits
3. Collecting input from person(s) assessed:
 - Management
 - Radiological Control Manager
 - Radiological Control Organization's "customers"
4. Determining applicability of industry issues such as:
 - Emerging technical issues
 - Application of best industry standards to site program
5. Reviewing policies and procedures, including:
 - Operating procedures
 - Radiological control policies



6. Assembling regulations and guidance documents:

- Federal
- State
- Site
- Industry or peer group

7. Preparing an assessment plan:

- Identify elements to be assessed
- Generate specific questions and/or standards against which to measure performance
- Develop record sheet for assessment responses, data, and field notes
- Allocate time for each assessment activity
- Intentionally leave unscheduled time

3. Self-Study Scenarios/Activities and Solutions

Review:

- 10 CFR 835, *Occupational Radiation Protection*
- DOE N441.1, *Radiological Protection for DOE Activities* (supersedes N5400.13 and 5480.11)
- DOE/EH-0256T (Revision 1), *DOE Radiological Control Manual*
- DOE Order 5400.5, *Radiation Protection of the Public and Environment*
- DOE Order 5480.4, *Environmental Protection, Safety and Health Protection Standards*
- DOE Order 5530.3, *Radiological Assistance Program*
- DOE Order 5530.5, *Federal Radiological Monitoring and Assessment Center*

Activity 1

A DOE contractor, whose primary missions involve medical research and training, maintains six buildings that contain radioactive material. The hazards associated with operations involving these materials are viewed as minimal and could be characterized as those similar to an academic research setting. The majority of the radioactive material at the contractor's facility consist of sealed sources, iodine-131, tritium, and carbon-14 labeled compounds, with a typical annual inventory in the microcurie to millicurie range. In performing their mission for DOE, the contractor's employees routinely receive occupational exposures that are less than 100 millirem annually.



Radiation Protection Competency 4.2

The contractor's facility was established in the 1980s with a workforce of 500. The original facility design criteria was for medical research and training. Today, the contractor employs 750 full-time employees, 50 of which are monitored radiation workers. The facility is located in a population center of 500,000.

You have been tasked with conducting an assessment of this facility's radiation protection program to ensure its compliance with radiation protection requirements. What are the steps you must take to complete this task?

Your Solution:

[illegible]



Activity 1, Solution

(Any reasonable paraphrase of the following is acceptable.)

- Step 1** Prepare an action plan.
- Step 2** Conduct the assessment using the action plan developed.
- Step 3** Communicate the results to the contractor and departmental line management.

When preparing for the assessment and preparing the action plan, consideration should be given to the following:

1. Decide if you are going to conduct an announced or an unannounced assessment. Announced assessments are scheduled through a pre-assessment memorandum. Unannounced assessments are used to determine "real" program performance.
2. Review upper-tier procedures describing the radiological control program. Perform document reviews of:
 - Operating procedures
 - Records for:
 - Dosimetry
 - Work control Radiological Work Permit (RWP)
 - Surveys (contamination, radiation level, air, special)
 - Occurrence reports, deficiency reports, and critiques
 - Regulatory reports
 - Radioactive effluent reports
 - Training and qualification
 - Instrument calibration and response testing
 - Special studies
3. Conduct a short (one hour or less) tour of the site/facility.
 - Tour site/facility, preferably with an experienced individual from the site.
 - Make notes of housekeeping and facility condition. Items to look for include:
 - Leaks, spills
 - Dirt, rust, and clutter
 - Poor equipment maintenance
 - Radiological control posting
 - Radiological Control Technician (RCT)/Radiological Worker interface
 - Employee morale



4. Interview Radiological Control Organization staff and "customers."

- Radiological Control Manager.
 - Knowledge of current radiological control regulations and industry standards
 - Identification of program deficiencies and priorities
 - Obstacles to improving program performance
- Radiological Control Supervisor(s).
 - Level of support given Radiological Control Program and radiological control manager
 - Identification of program deficiencies and priorities
 - Obstacles to improving program performance

NOTE: Compare responses from RadCon manager and RadCon supervisor(s).

- Radiological control staff members responsible for major technical functional areas. Examples of these functional areas include:
 - Organization and administration
 - Personnel training and qualification
 - Quality assurance
 - ALARA
 - Radiological work control
 - + Procedures
 - + RWPs
 - Posting and labeling
 - Radioactive material control
 - + Source control
 - + Release of materials
 - + Receipt and transportation
 - Entry control
 - Contamination control
 - Instrumentation alarms
 - Monitoring
 - + Workplace
 - + Effluent
 - + Environmental
 - Dosimetry
 - + External
 - + Internal (bioassay)
 - Respiratory protection
 - Facility-specific features



Radiation Protection Competency 4.2

- + Tritium
- Radioactive waste management
- Emergency response
- Records
- Assessments/performance indicators

NOTE: Document their responses to incidents in their technical area. Discuss impediments to improving their programs.

- Qualified Radiological Control Technicians (RCTs).
 - The depth and breadth of knowledge of radiation protection
 - Technical issues unique to the site/facility
 - Effectiveness of the working relationship between RCTs and their "customers"
- Radiological Control Program "Customers."
 - Knowledge of fundamental radiation protection concepts and good radiological worker practices
 - Working relationship with the RCTs
 - Obvious or hidden problems
 - Poor communications
 - Division of work problems
 - Overall, how the Radiological Control Organization is regarded ("policeman" or team member)

5. Observe Radiological Workers/RCTs in the workplace.

- Recommendations for observing work include:
 - Dress as the individuals being observed
 - Work the same hours they work
 - Stand away from the immediate work area, but close enough to watch the work proceed
 - Resist the urge to get involved in the work
 - Be professional and courteous, but not familiar
- Key areas to watch for include:
 - Procedure violations
 - Failure to follow RWP requirements for:
 - + Dosimetry
 - + Protective clothing
 - + Respiratory protection
 - + RCT coverage
 - + Surveys
 - + Special instructions



- Poor Rad Worker practices:
 - + Reaching across radiological boundaries
 - + Scratching body with gloved hand
 - + Inadequate frisking
 - + Loitering in a high radiation field
- Poor housekeeping; disorderly work area
- Wasted time and effort due to ineffective work planning
- Communication problems
- Poor relationships between Radiological Workers and RCTs

Activity 2

During the assessment the following data was gathered.

- The survey instruments had been calibrated 1.5 years ago.
- A random sample of the Training and Qualification Records indicated that retraining had not been done for 2.5 years.

During the interview with the RadCon manager, the following questions were asked and replies given:

- How are requirements for entry into a radiation area determined?
Answer Strictly from the regulations. For example, 10 CFR 835.
- How do you know the current requirements for qualification are kept up to date?
Answer I depend on my RadCon supervisor to keep up with this information.

During the interview with the RadCon supervisor, the following questions were asked and replies given:

- How are requirements for entry into a radiation area determined?
Answer From what we determine is the important thing to do.
- Are qualification requirements identified for all positions in the "Operating Organization ?"
Answer I'm not sure, but my RadCon people are up to date on their RadCon qualifications.

During the interview with a random sample of radiation workers the following question was asked and reply given.

- When did you receive your last radiation dose report?
Answer About two years ago.

During the assessment, the following situation was observed:



Radiation Protection Competency 4.2

Rad Workers "1" and "2" approached a posted radiological area. Worker "1" was carrying a canned drink and Worker "2" was chewing gum. Worker "1" was heard to say, "Do you have the RWP?" Worker "2" replied, "I thought you had it." Worker "1" was then heard to ask, "Where is the RadCon technician?" The reply was "I haven't seen him."

Worker "1" was then observed pulling out his pocket dosimeter and reading it. He also asked Worker "2" where his dosimeter was. Worker "2" responded, "I forgot it; I'll just use your reading." During this interchange, Worker "2" was observed taking a swallow of his drink and placing the can on the floor.

The workers entered the radiological area with Worker "2" carrying his drink, which he placed on the floor next to the door. Next, Worker "1" was seen sticking his chewing gum to a pipe support. Worker "1" noticed that the green isolation valves were open and told Worker "2". Worker "2's" response was, "So, close them." Worker "1" closed the valve while remarking to Worker "2", "I wish we had been trained to work on this valve. It sure would be easier if we knew what we were doing and had received some type of briefing." Worker "2" responded, "No big deal, we can wing it."

The workers continued working with the valve. Worker "2" stopped his work and asked Worker "1" if he had seen the replacement valve. Worker "1" pointed to the valve outside the area and replied, "I'll go get it."

Worker "1" was seen leaving the radiological area to get the valve. Upon returning to the radiological area with the valve, the worker kicked over the canned drink. He handed the valve to Worker "2" and was heard to remark, "My mouth is sure dry." Worker "2" offered him a piece of gum and Worker "1" accepted it, unwrapped it, and started chewing it.

Given this information, analyze the results of the assessment to determine contractor compliance or noncompliance with the requirements.

[illegible]



Activity 2, Solution

(Any reasonable paraphrase of the following is acceptable.)

There are several areas where the contractor is not in compliance. Subpart E of 10 CFR 835 states that "Instruments used for monitoring and contamination control shall be periodically maintained and calibrated on an established frequency of at least once a year."

Subpart F of 10 CFR 835, Entry Control Program, lists requirements for entry into a radiation area.

The RadCon manager should not rely on the RadCon supervisor. A report should be generated and the RadCon manager should review this report to ensure that qualifications are up to date.

The RadCon supervisor does not have the proper understanding of the law. Subpart F of 10 CFR 835, Entry Control Program, lists requirements for entry into a radiation area. Subpart J of 10 CFR 835, Radiation Safety Training, states that retraining shall be conducted at intervals not to exceed two years. The supervisor can be held accountable and the contractor can be fined for noncompliance under the Price Anderson Amendments Act.

Subpart I of 10 CFR 835 states that each individual monitored, during the year, shall be provided a radiation dose report on an annual basis.

The following were activities that may be potential problems:

- Worker "1" was chewing gum
- The workers did not have a copy of the RWP at the work site
- There was no RCT present (RWP called for continuous coverage)
- Worker "2" carried a soft drink into the area
- Worker "1" created a liquid spill in the radiological area
- Worker "1" was given gum and chewed it in the area
- The replacement valve was not initially taken into the area
- There was no prejob briefing conducted (based on conversation)
- Green isolation valves were not closed prior to beginning work
- The workers had no training on conducting the work



Activity 3

Given the results from the analysis of the above data, document and communicate the results to contractor and departmental line management.

Your Solution:

[illegible]



Activity 3, Solution

(Any reasonable paraphrase of the following is acceptable.)

Post-assessment Activities

At the post-assessment conference, summarize the findings identified during the assessment. This is an opportunity for additional questions about the findings. Any requests for correctable actions, dates, or a need for follow-up assessments can be identified at this time. Thank everyone for cooperation and support during the assessment.

1. Publish assessment findings.
2. Receive site responses, which should include the following:
 - Action items
 - Responsible individuals/groups
 - Action item due dates
3. Accept/reject/modify responses.
4. Develop corrective action tracking list.
5. Publish a periodic action item status report.
6. Maintain a separate file of open action items.
7. Personally verify the closure of action items.
8. Evaluate the adequacy of actions taken to close open findings:
 - Has root cause been correctly identified and corrected?
 - Are follow-up assessments needed?



4. Suggested Additional Readings and/or Courses

Courses

NOTE: See Appendix B for additional course information

- DOE/EH-0450 (Revision 0), *Radiological Assessors Training (for Auditors and Inspectors) - Applied Radiological Control*, sponsored by the Office of Defense Programs, DOE
- *Applied Health Physics* -- Oak Ridge Institute for Science and Education
- *Radiation Protection General Technical Base Qualification Standard Training* -- GTS Duratek



This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.